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John Horton Conway: A Puzzle Game

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JOHN HORTON CONWAY

A Puzzle Game

By Jeremiah and Karen Farrell

A presentation at G4G11, March 2014

Atlanta, Georgia

There are 10 different letters in the name JOHN HORTON CONWAY and we use each of these exactly three times each to form the following ten words: JHC, COW, NYC, JAN, RON, WRY, RAT, JOT, HWT, HAY.

Puzzle 1: (easy) Place the ten words on the nodes of the Pentalpha Star so that each of the three instances of a given letter lies on a triangle.

Puzzle 2: (easy) Place the ten words on the nodes of Desargues' Mitre so that each of the ten lines contains a common letter.

Puzzle 3: Play the ancient game of Pentalpha on the star. That is, try to place nine coins on the star by starting on an empty node, jumping a node (empty or not) and placing a coin on an empty node in a straight line of three. After you have solved Puzzle 1, try to leave the tenth, empty node with the initials of our honoree JHC.

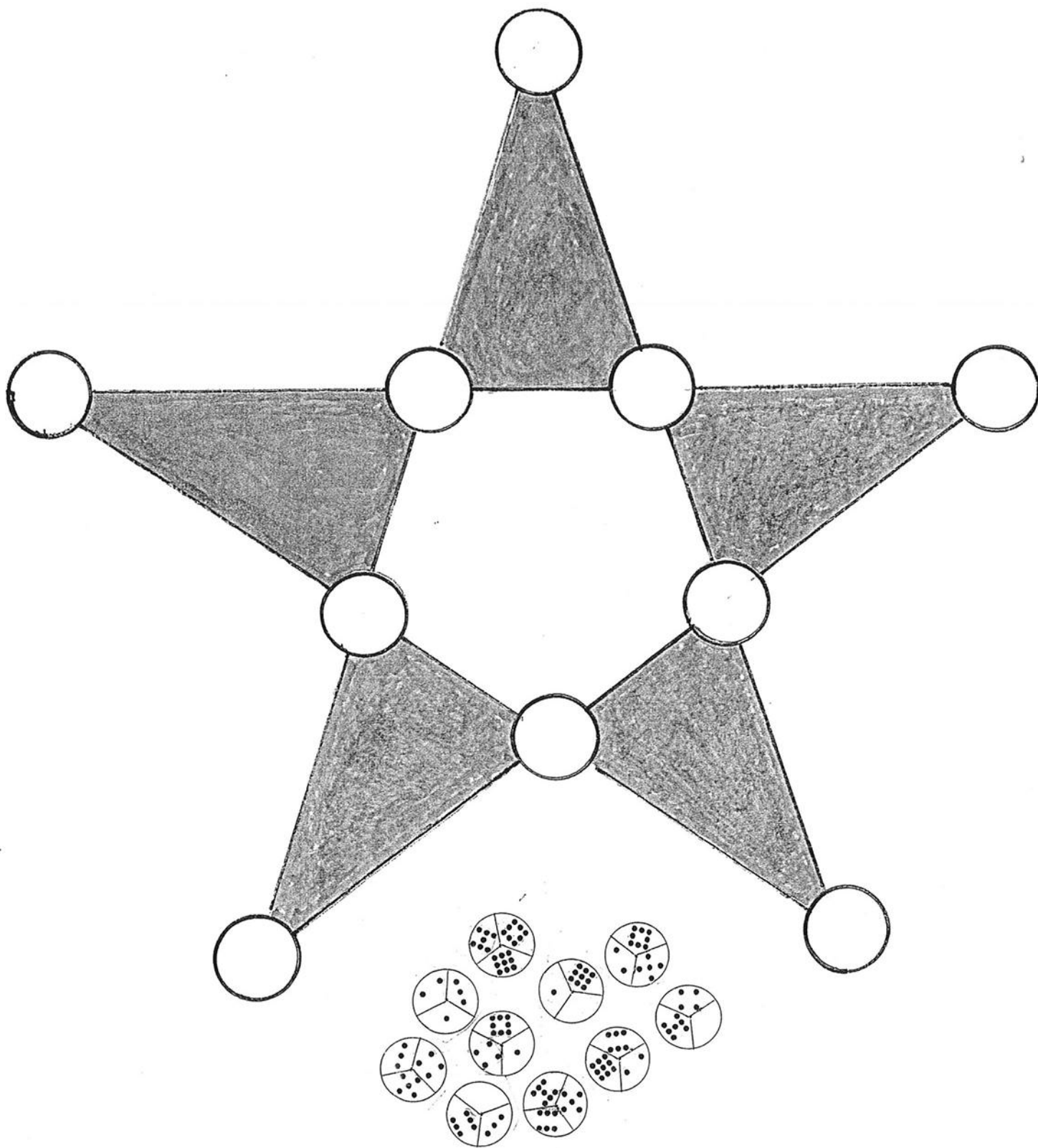
Puzzle 4: Use the ten "trimonos" to solve any of the three previous puzzles.

Puzzle 5: Use any set of ten pieces to play "Keep-Away" on the nodes of the Pedersen graph. That is, nodes joined by a line have no letter in common.

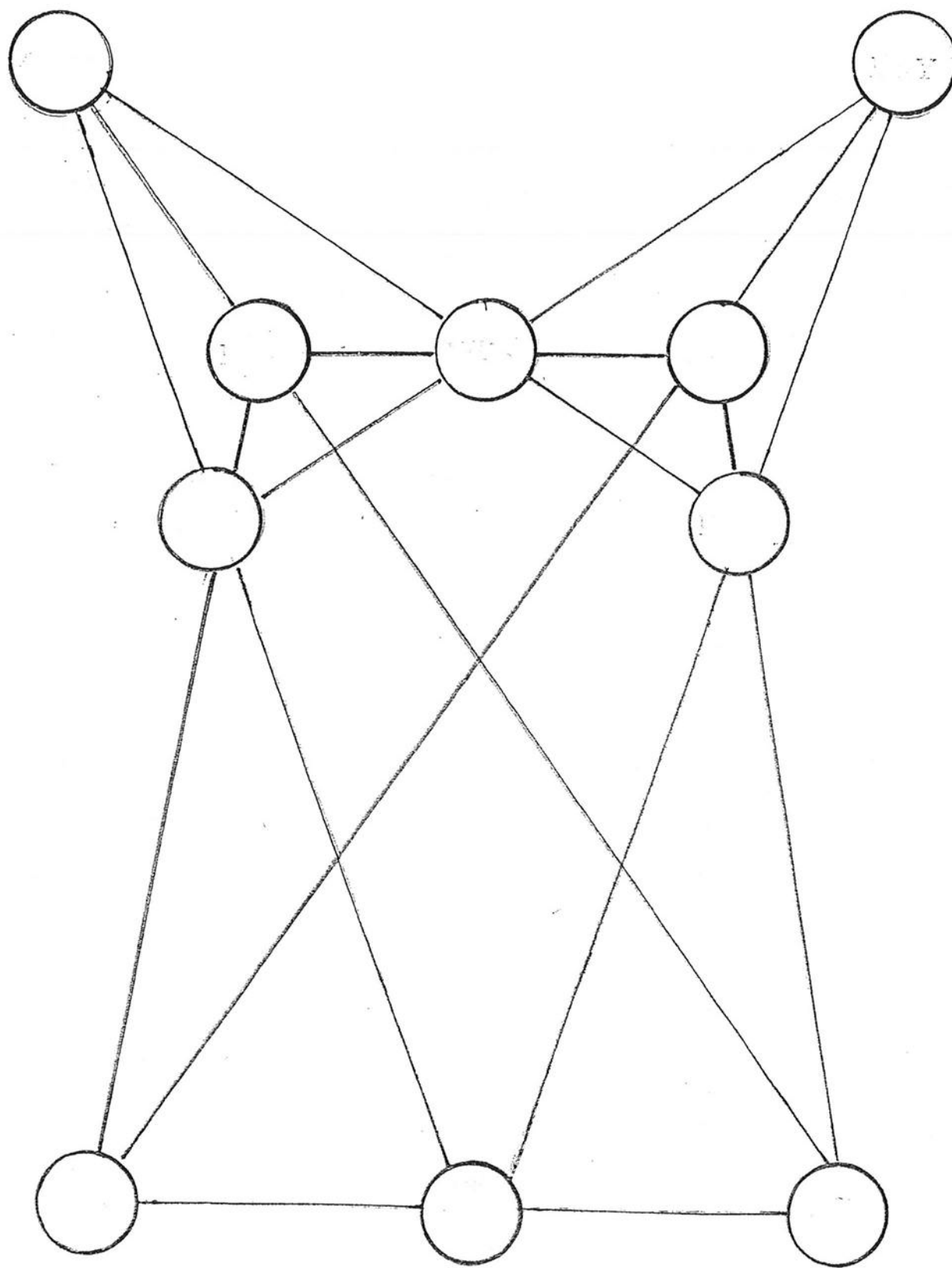
Games: Play Tic-Tac-Toe on Desargues' Mitre where the first to get three in a row wins. Also play Tic-Tac-Toe on Pentalpha, where the first to get a triangle wins. The two players could use pennies and nickels as their respective tokens.

A Magic Trick: Using, say, the ten trimonos, secretly palm one of them and arrange the other nine into a cycle so that adjoining pieces have no symbol in common. Then scramble the pieces and add the palmed tenth piece and ask the subject to find a cycle that completes what is known as a "Traveling Salesman" problem. The subject will not be able to do this.

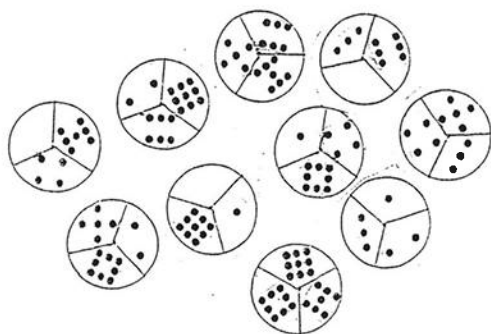
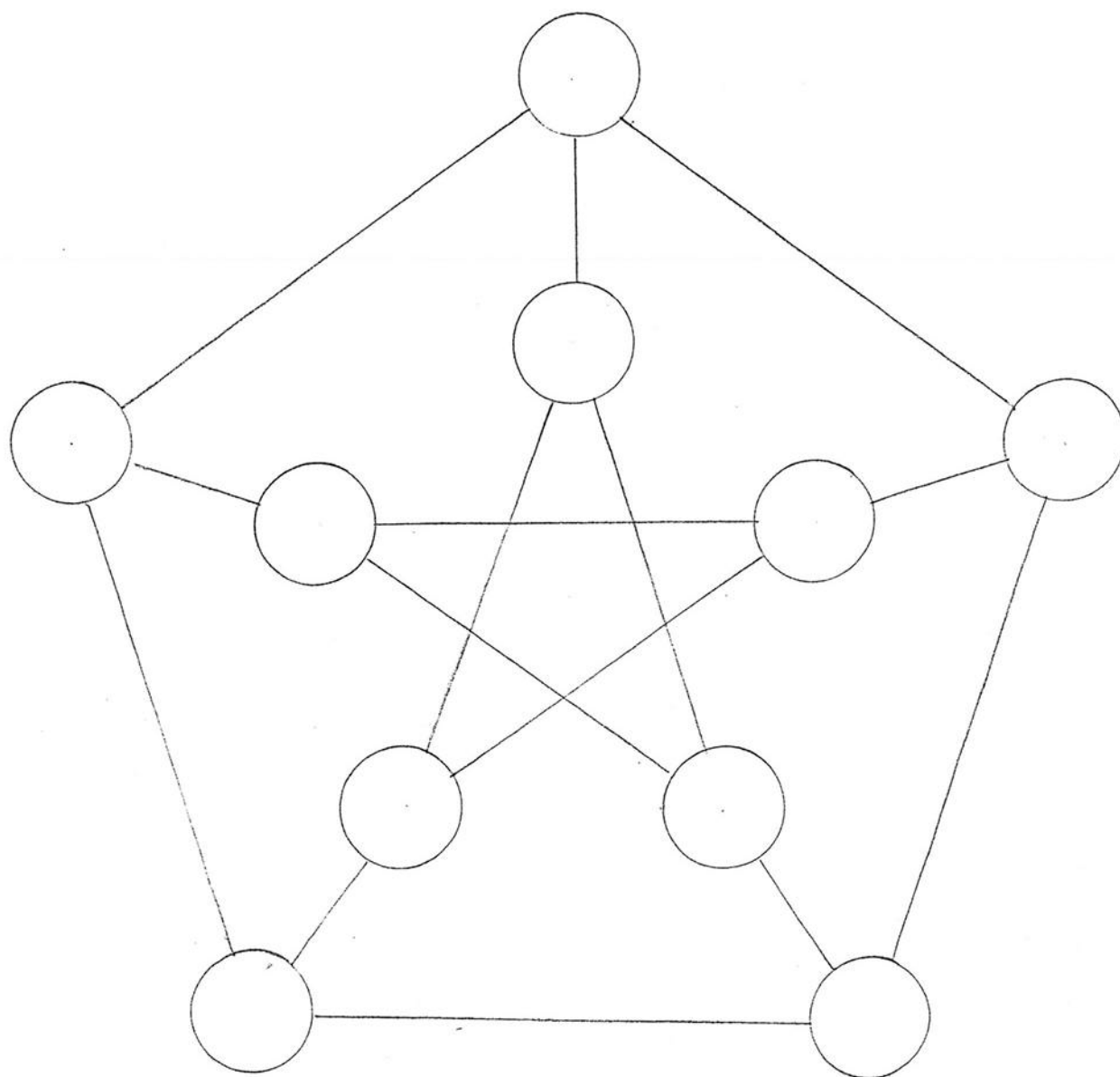
Remarks: There are 120 solutions to the first two puzzles and two solutions to the third. The Tic-Tac-Toe games are forced first-person wins from any start. The magic trick works since this "misgraph" uses the fundamental, non-Hamiltonian graph. For more details see "Configuration Games" by Jeremiah Farrell, Martin Gardner and Thomas Rodgers in *Tribute to a Mathematician*, 2005, A.K. Peters, Ltd.



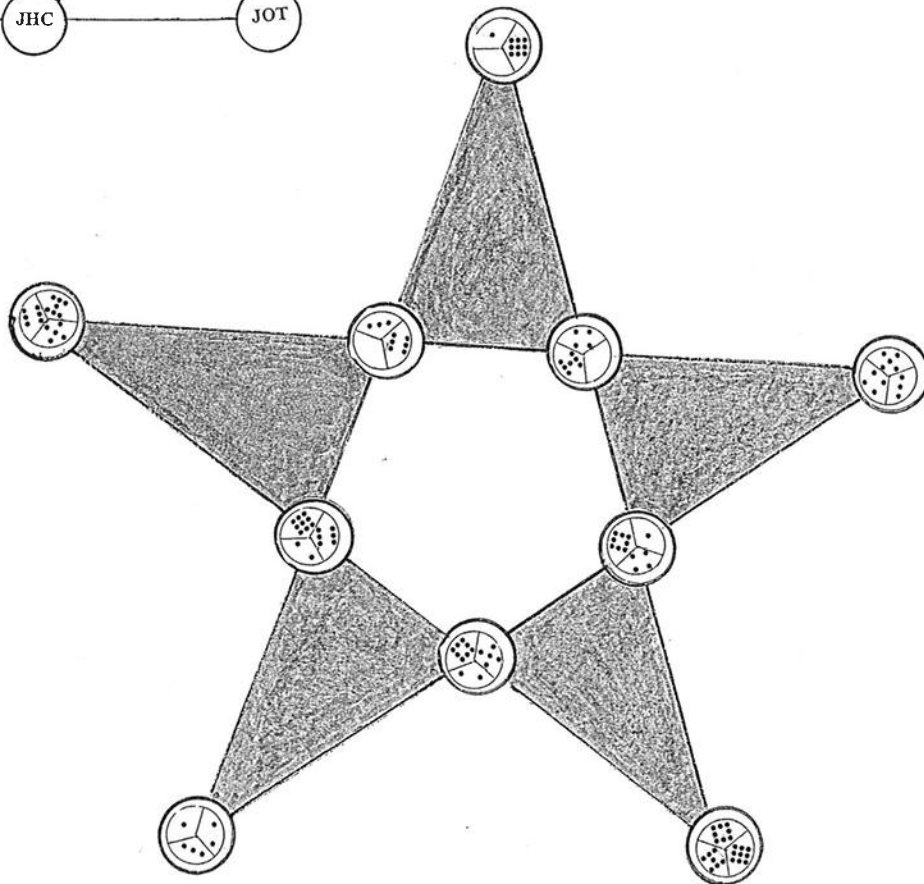
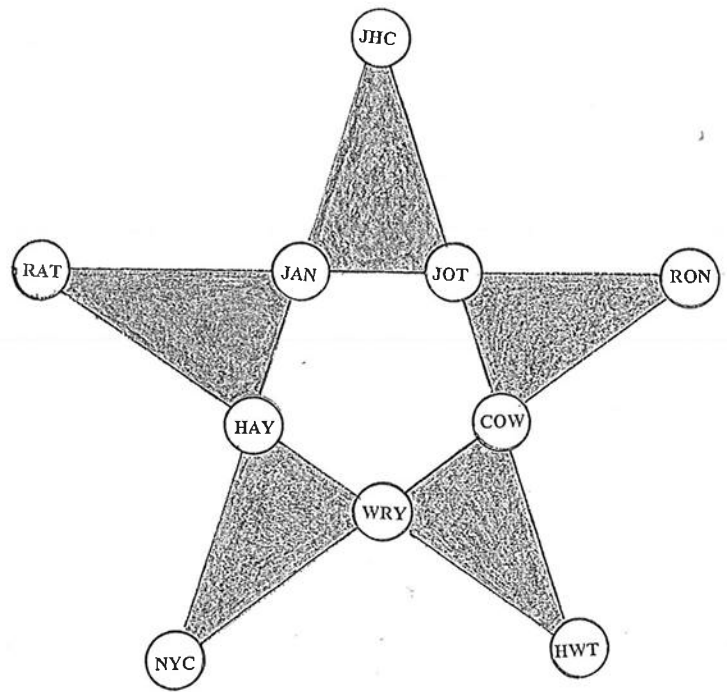
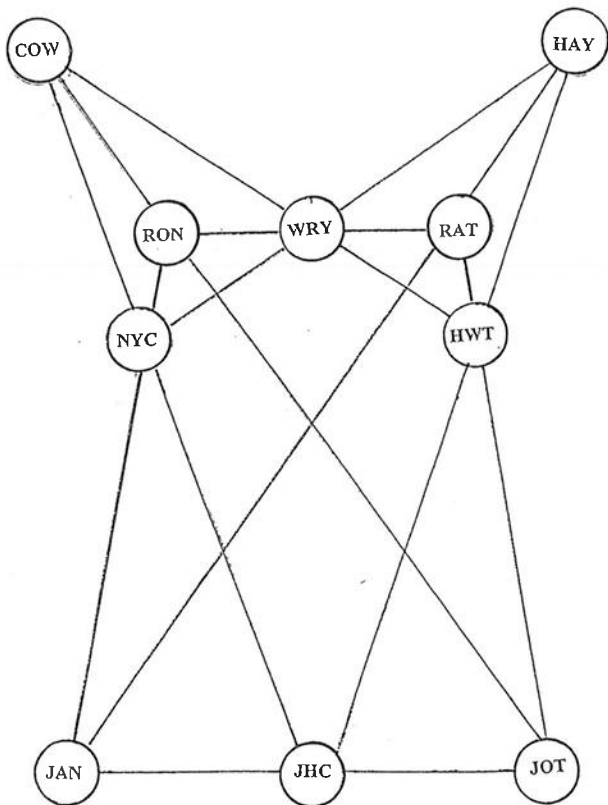
PENTALPHA



DESARGUES' MITRE



KEEP-AWAY



SOME SOLUTIONS

(For Puzzle 3 use the order we gave the words as a hint as to how to obtain the 2 solutions.)